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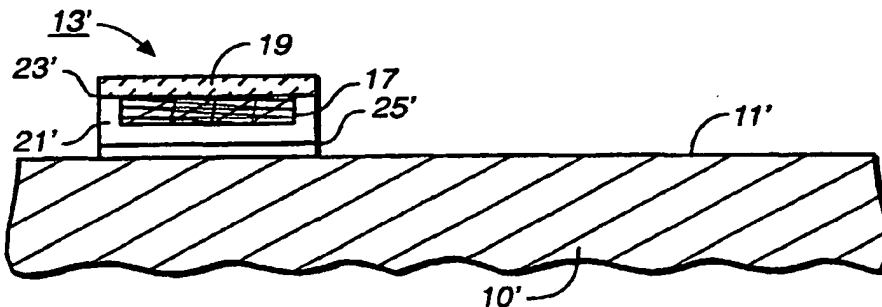
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(54) Title: OPTICAL TECHNIQUES FOR MEASURING PARAMETERS SUCH AS TEMPERATURE



(57) Abstract: A sensor of a parameter such as temperature includes an indicator encapsulated within a rigid enclosure, wherein the sensor has a characteristic that varies with the parameter that is detectable upon illumination with electromagnetic radiation through a window of the enclosure that is transparent to the radiation. In a specific example, the indicator changes an optical characteristic such as its color as a function of its temperature, and may be of an irreversible type in order to indicate the peak temperature reached. The sensor may include a pattern of such indicators that have different peak temperatures to which they respond, so that the sensor gives a unique visual pattern at each temperature within its measurement range.

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**A. CLASSIFICATION OF SUBJECT MATTER**  
IPC 7 G01K11/12

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 G01K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4 248 089 A (HEINMETS FERDINAND) 3 February 1981 (1981-02-03) the whole document	1-4
A	---	6-8,10
X	DE 27 28 439 A (THEURER PETER) 17 May 1979 (1979-05-17) the whole document	1
A	---	3,4,8-10
A	PATENT ABSTRACTS OF JAPAN vol. 007, no. 101 (P-194), 28 April 1983 (1983-04-28) -& JP 58 026236 A (HIROAKI KISHI), 16 February 1983 (1983-02-16) abstract -----	1,4,6,8

☐ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

## \* Special categories of cited documents:

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

- "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
- "&" document member of the same patent family

Date of the actual completion of the international search

7 February 2001

Date of mailing of the international search report

11.05.01

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CHAPPLE I.D.

## INTERNATIONAL SEARCH REPORT

International application  
PCT/US 00/29968**Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)**

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
  
2. ☐ Claims Nos.:  
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
  
3. ☐ Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

**Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)**

This International Searching Authority found multiple inventions in this International application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
  
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
  
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
  
4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

1-16

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

Form PCT/ISA/210 (continuation of first sheet (1)) (July 1998)

International Application No. PCT/US 00/29968

## FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. Claims: 1-16

A device for measuring at least one parameter

2. Claims: 17-25

A substrate carrying a plurality of temperature sensors,  
each sensor comprising a plurality of indicators

3. Claims: 26-29

A method for measuring temperature, comprising an imaging  
system

4. Claims: 30-32

A method for determining the temperature distribution of a  
semiconductor wafer when placed in a plasma processing device

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Cited Doc: WO 0136916A3 I

International Application No

Cited in: 02025300

Information on patent family

PCT/US 00/29968

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 4248089 A	03-02-1981	NONE	
DE 2728439 A	17-05-1979	NONE	
JP 58026236 A	16-02-1983	NONE	

Form PCT/ISA/210 (patent family annex) (July 1992)